MPR 1840.3
REVISION A
EFFECTIVE DATE: October 28, 2004
EXPIRATION DATE: October 28, 2009

MARSHALL PROCEDURAL REQUIREMENTS

AD01

MSFC HAZARDOUS CHEMICALS IN LABORATORIES PROTECTION PROGRAM

DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		12/20/99	History log added with this revision; previous history contained in Directives Manager's Reference File. Updated format from MM to MPG and changed ownership from CO01 to AD01.
Revision	A	10/28/2004	Corrected history log to show previous edition was the baseline (as was stated on the cover page and headers); deleted P.3.b NHS/IH-1845.5, "NASA Health Standard on Occupational Exposure to Hazardous Chemicals in Laboratories"; changed P.4.c to MPG 1840.2, MSFC Hazard Communication Program; added P.4.d, MWI 8715.4, "Personal Protective Equipment"; replaced director's name; 2.2 deleted Manager, Management Support Offices and added Director; deleted 2.2.5; 2.3.5 added in accordance with MWI 8715.4, "Personal Protective Equipment; 2.3.8 added in accordance with MPG 1840.2, "MSFC Hazard Communication Program"… Replaced the chapters with Appendix A: Chemical Hygiene Plan Template; changed font type to Times New Roman and will to shall throughout document. Changed guideline to requirement in header and throughout document. Added to Appendix A 5.6, the word "varying." Changed MPG to MPR where mentioned in the document.

TABLE OF CONTENTS

PREFACE

P.1 PURPOSE

To establish the Marshall Space Flight Center (MSFC) Hazardous Chemicals in Laboratories Protection Program (also referred to as the Chemical Hygiene Standard (CHS)) in compliance with Occupational Safety and Health Administration (OSHA) standards.

P.2 APPLICABILITY

This Directive is applicable at all MSFC facilities.

P.3 AUTHORITY

OSHA Standard 29 CFR 1910.1450

P.4 APPLICABLE DOCUMENTS

a. NPD 8715.1, "Safety and Health Handbook - Occupational Safety and Health Programs"

b. MPD 1840.3, "MSFC Respiratory Protection Program"

c. MPR 1840.2, "MSFC Hazard Communication Program"

d. MWI 8715.4, "Personal Protective Equipment"

e. MWI 8550.1, "Waste Management"

P.5 REFERENCES

None

P.6 CANCELLATION

MPG 1840.3 dated December 20, 1999

Original signed by
Robin N. Henderson for

David A. King
Director

DOCUMENT CONTENT

1. DEFINITIONS

1.1 Chemical Hygiene Officer. An employee who is designated by the employer, and who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan (CHP).

1.2 Chemical Hygiene Plan (CHP). A written plan developed and carried out by MSFC laboratory facilities to ensure the protection of employees from the effects of hazardous chemicals. The Plan sets forth procedures, laboratory and control equipment, personal protective gear, and work practices that are capable of providing this protection.

1.3 Hazardous Chemical. A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. These include chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes; also, chemicals for which there is scientifically valid evidence that they are: a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive), or water-reactive.

1.4 Laboratory. Any facility (large or small) where the handling/use of hazardous chemicals is accomplished in containers (used for reactions, transfer, etc.) designed to be easily and safely manipulated by one person. It is a work place where relatively small quantities of hazardous chemicals are used on a non-production basis.

2. RESPONSIBILITIES

2.1 The Center Director or his/her designee shall be responsible for:

2.1.1 Having ultimate accountability for chemical hygiene at MSFC and providing continuing support for the CHP.

2.1.2 Ensuring the availability of resources necessary for the establishment, execution, and maintenance of the CHP.

2.2 Director, Center Operations Directorate, shall be responsible for:

2.2.1 Establishing a training curriculum to assure Centerwide compliance with this Directive and OSHA Standard 1910.1450.

2.2.2 Assuring medical consultations/examinations are handled in accordance with this Directive.

2.2.3 Establishing and maintaining an accurate record of any measurements taken to monitor employees' exposures and any medical consultations and examinations including tests or written opinions required by OSHA Standard 1910.1450.

2.2.4 Providing oversight and serving in an advisory capacity to all Center organizations in establishing a CHP as defined in this Directive.

2.3 Directors/Managers/Team Leads/Supervisors shall be responsible for:

2.3.1 Developing and implementing a CHP for each applicable laboratory facility within their organization.

2.3.2 Designating a Chemical Hygiene Officer for each applicable laboratory facility within their organization.

2.3.3 Ensuring that appropriate employees attend all training classes as necessary to meet the requirements of this Directive.

2.3.4 Ensuring employees comply with the provisions of the CHP.

2.3.5 Ensuring appropriate personal protective and emergency equipment is available, used as required, maintained in good working order, and applicable training provided in accordance with MWI 8715.4, "Personal Protective Equipment."

2.3.6 Knowing the current legal requirements concerning regulated substances.

2.3.7 Ensuring the facilities and training for use of any material are adequate.

2.3.8 Ensuring Material Safety Data Sheets (MSDSs) used within the laboratory are readily accessible to the employees in accordance with MPR 1840.2, "MSFC Hazard Communication Program."

2.3.9 Conducting regular, formal chemical hygiene and housekeeping inspections including routine inspections of emergency equipment.

2.4 Manager, Environmental Engineering Department, Center Operations Directorate, shall be responsible for ensuring proper accumulation, removal, and disposal of chemical waste.

2.5 Chemical Hygiene Officer(s) shall be responsible for:

2.5.1 Working with appropriate managers, team leads, supervisors, employees, etc., to develop

and implement the overall CHP including the CHP and procedures pertaining thereto.

2.5.2 Remaining current on the potential hazards associated with the use of laboratory chemicals, both regulated and non-regulated.

2.5.3 Reviewing proposed laboratory uses of highly toxic, carcinogenic, genotoxic, etc., chemicals and the proposed precautions used to protect employees, including specific designated work areas.

2.5.4 Providing for annual review of the CHP and ensuring that modifications are made as necessary.

2.5.5 Ensuring that exposure assessments are conducted if there is reason to believe that exposure levels to a chemical substance could routinely exceed the action level (or permissible exposure limit/threshold limit value (PEL/TLV) in the absence of an action level).

2.5.6 Ensuring that technical advice is available on exposure assessment; possible by-products of reactions; containment, decontamination, neutralization procedures, alternative procedures or less hazardous substitutes; etc.

2.5.7 Ensuring that monitoring is conducted to evaluate the proper functioning of fume hoods and other engineering controls, and that prompt repairs are made as needed.

2.5.8 Ensuring that MSDS for all laboratory chemicals are included in the central MSDS file for the worksite; also ensuring that reference books and data bases containing information about potential health hazards, safe handling procedures, chemical storage, and emergency response to fire or releases of chemicals stored or used in the laboratory are maintained.

2.5.9 Ensuring that a complete and up-to-date inventory of all hazardous laboratory chemicals used within their responsible area is maintained.

2.5.10 Ensuring that sufficient coordination is employed so that regulatory requirements relating to procurement, storage, use, collection, transportation, and disposal of chemicals used in laboratories are followed.

2.5.11 Ensuring that employees are notified of any overexposures indicated by exposure assessments.

2.5.12 Ensuring that all employee complaints relative to health hazards in the laboratory are investigated and reviewed.

2.5.13 Providing an updated copy of the laboratory CHP to the Medical Center each year for review and retention.

2.5.14 Maintaining adequate documentation of all accomplished training for laboratory personnel.

2.6 Laboratory Employees shall be responsible for:

2.6.1 Attending required training courses to ensure they are knowledgeable of all requirements for protecting themselves in a chemical laboratory environment.

2.6.2 Conducting each laboratory operation in accordance with the CHP (e.g., following established work practices and procedures, wearing appropriate protective equipment and clothing, etc.).

2.6.3 Developing, maintaining, and practicing good personal chemical hygiene while working with chemicals.

2.6.4 Reporting all ill effects experienced or conditions/ operations observed relating to chemical use which they feel may have an adverse affect on their health or well-being.

2.7 Contracting Officers shall be responsible for ensuring this Directive is incorporated into contracts governing all operations at MSFC and component installations so that actions may be taken that are consistent with the intent and provisions of this Directive.

3. PROCEDURE

3.1 A chemical hygiene plan shall be developed for each applicable laboratory. This plan is a laboratory unique document that addresses the chemical hygiene requirements. Every laboratory at MSFC is different and presents its own unique situations that need to be addressed in operating procedures that are incorporated within the CHP. The CHP shall address the following elements:

a) Standard Operating Procedures that are relevant to the safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals.
b) A list of control measures such as engineering controls, PPE and hygiene practices, in particular control measures from extremely hazardous chemicals.
c) Use of fume hoods and other protective equipment, including maintenance and verification of proper operation.
d) Provisions for additional employee protection for particularly hazardous substances which include select carcinogens, reproductive toxins, and substances that have high degree of acute toxicity.
e) Employee information and training requirements.
f) Identification of circumstances in which a particular operation or activity shall require prior approval before implementation.
g) Provisions for medical consultation and examination.

h) Designation of a CHO and other personnel who are responsible for the implementation of the CHP.

Appendix A serves as a template which is intended to be used as a boilerplate for developing the laboratory specific CHP.

4. RECORDS

Chemical hygiene plans shall be maintained by each applicable laboratory and updated at least annually or when processes changed. Older versions of CHPs shall be disposed after 3 years or archived for historical purposes.

5. FLOW DIAGRAM

None

APPENDIX A

PREPARING A CHEMICAL HYGIENE PLAN

The following template may be used to prepare a laboratory-unique chemical hygiene plan. Although the plan may be in any format, it shall include the elements listed in paragraph 3.1 of this procedure and the appropriate requirements below:

A.1 General Principles.

A.1.1 Minimize Exposures to Chemical Hazards. Personnel in research laboratories may be working with new chemicals whose hazards may not be well known. Personnel shall use control measures available to minimize or eliminate their potential exposure to the chemicals in their lab. Ensure all pertinent information is available on all new chemicals procured and MSDS forms are reviewed prior to use.

A.1.2 Do Not Underestimate Risk. Personnel shall always observe good laboratory practices and minimize exposure by working in a specified exhaust hood, wear eye and hand protection and a laboratory coat, apron, and any other applicable personal protective equipment (PPE). If substances have special hazards, take special precautions. Always assume that any mixture will be more toxic than its most toxic component and that all substances of unknown toxicity are toxic. All new and untested chemicals should be treated as though they are toxic until proven otherwise. Laboratory personnel should have an understanding of the types of toxicity, know the routes of exposure, and recognize the major classes of toxic and corrosive chemicals.

A.1.3 Maintain Adequate Ventilation. The best way to prevent exposure to airborne substances is to prevent their escape into the working atmosphere by use of hoods and other ventilation devices. Operations such as running reactions, heating or evaporating solvents, and the transfer of chemicals from one container to another should normally be performed in a hood. Laboratory apparatus that may discharge toxic vapors shall be vented to an auxiliary local exhaust system. If auxiliary local ventilation is not practical during measurement or storage, samples should be kept in closed containers.

A.1.4 Observe the PELs and TLVs. Personnel shall make every attempt to not exceed the Permissible Exposure Limits (PEL) of OSHA and the Threshold Limit Values (TLV) of the American Conference of Government Industrial Hygienists. Control measures shall be designed and utilized to prevent exposures exceeding these guidelines. PELs and TLVs may possibly be located on the MSDS or contact Environmental Health for assistance.

A.1.5 Material Safety Data Sheets (MSDSs): Upon completion of the annual chemical inventory, request letters shall be sent to manufacturers if MSDSs are missing.

A.1.5.1 Master File and Availability. MSDSs shall be available to everyone working in our laboratories. The MSDS shall be filed along with a chemical inventory of the section. The

laboratory relies on the chemical manufacturer's information to ascertain whether or not the chemical is hazardous. The MSDS Master File for each chemical is located in the following location: http://eemo.msfc.nasa.gov/environmental/haz_mat/msds_search.htm

A.2 General Procedures for Working with Laboratory Chemicals.

A.2.1 Minimize exposure to all chemicals. Personnel shall know the types of protective equipment available and use the proper type for each job. Wear appropriate gloves when the potential for contact with toxic materials exists. Inspect the gloves before each use for discoloration, puncture, and tears, and replace gloves periodically. Questions regarding appropriate personal protective equipment may be directed to the Medical Center's environmental health staff.

A.2.2 Prior to working with new chemicals, the MSDS shall be read and the precautions for safe handling observed.

A.2.3 Always be alert to unsafe conditions and actions.

A.2.4 Personnel shall use good personal hygiene. Do not eat, drink, smoke, chew gum, or apply cosmetics where chemicals are present. Wash hands before doing any of these activities and before leaving the laboratory area.

A.2.5 Do not store food or beverages in laboratory refrigerators. Refrigerators used for storing chemicals shall be labeled, "NOT FOR FOOD OR DRINK." Do not handle or eat any food or beverages in chemical storage areas or laboratory areas.

A.2.6 Avoid working alone in a building or in a laboratory if the procedures being conducted are hazardous. During normal business hours, arrangements can be made between individuals working in separate laboratories to crosscheck periodically. After-hours operations generally require that two people be present.

A.3 General Procedures for Working with "Particularly Hazardous" Substances.

A.3.1 Particularly hazardous substances such as "select carcinogens," reproductive toxins, and substances that have a high degree of acute toxicity require special procedures and precautions.

A.4 In general, procedures for handling these particular hazardous substances include:

A.4.1 Planning. Know the safety rules and procedures that apply to the work being performed. Review MSDSs and other applicable documents to determine the potential hazards that may be encountered and appropriate safety precautions to use.

A.4.2 Unattended Operations. Lights should be left on and place an appropriate sign on the door or, in a shared area, or in front of the equipment.

A.4.3 Use of a Hood. Personnel shall use the hood for operations that might result in the release of toxic chemical vapors or dust. Contact Environmental Health Services if you think your hood is not working properly to provide sufficient flow. Included below are the rules for using fume hoods in our laboratories:

A.4.4 Waste Disposal. Proper disposal of waste or used substances is everyone's responsibility and shall be performed in accordance with MWI 8550.1, "Waste Management." Contact the Hazardous Waste Branch (544-4787) for recommendations/regulations regarding appropriate waste disposal. Keep hazardous waste containers closed except when it is necessary to add waste. Contact the Hazardous Waste Branch to turn in container when filled to capacity or when no longer needed at the site.

A.5 Distribution and Storage.

A.5.1 Toxic substances shall be segregated in a well-identified area with local exhaust ventilation, away from light, heat, acids, oxidizing agents, moisture, etc. Chemicals that are highly toxic or other chemicals whose containers have been opened shall be in unbreakable secondary containers.

A.5.2 The quantity of chemicals kept in the laboratory should be as small as practical.

A.5.3 Flammable liquids should not be stored in laboratory refrigerators unless the unit is an approved explosion-proof or laboratory-safe type.

A.5.4 Annual inventories shall be conducted, preferably by the users of the chemicals. Obsolete or unneeded items shall be properly discarded or turned in for proper disposal. Stored chemicals shall be examined at least annually for replacement, deterioration, and container integrity.

A.5.5 When chemicals are hand-carried, the container should be placed in an outside container or acid-carrying bucket to protect against breakage and spillage. If small quantities of flammable liquids will be moved, use rugged pressure-resistant, non-venting containers, store during transport in a well-ventilated vehicle and eliminate potential ignition sources.

A.5.6 Signs and Labels. Prominent signs and labels of varying types shall be posted by the Chemical Hygiene Officer or by appropriate safety personnel.

A.6 Spills and Accidents.

A.6.1 All spills and accidents that require assistance shall be reported at once by dialing 4-HELP. Also, laboratory management shall be notified immediately.

A.7 Housekeeping, Maintenance, and Inspections.

A.7.1 Work areas should be kept clean and free from obstructions. Other items of maintenance

are as follows:

A.7.2 Eyewash fountains and safety showers shall be tested/inspected monthly and documented. Respirators and other safety equipment shall be inspected periodically.

A.8 Selection and Use of Control Measures.

A.8.1 Criteria for the Use of Control Measures. The use of any engineering control, protective equipment or hygiene practice shall be determined by the chemical(s) being used. Five major principles of chemical hygiene provide the general criteria for the use of control measures in the laboratory:

a. Read the MSDS and know the safety and health hazards and personal protective equipment required before using any hazardous chemical.
b. Minimize all chemical exposure.
c. Do not underestimate risk.
d. Provide adequate ventilation.
e. Observe PELs and TLVs.

The nature of the hazard presented by the chemical shall determine the type of protection required. The severity of the hazard shall determine the extent of the controls to be used.

Information on the hazards that shall determine the type and extent of control measures can be found in the manufacturer's MSDS, as well as information from the OSHA and the American Conference of Governmental Industrial Hygienists. The Chemical Hygiene Officer and Environmental Health Services can provide assistance in the determination of the necessary control measures.

A.8.2 Engineering Controls. Engineering controls start with the general ventilation system. The general ventilation system shall have air intakes and exhausts located so as to avoid intake of contaminated air, but it should not be relied on for protection from toxic substances released into the laboratory.

The fume hood is the primary engineering control in the lab. Other local ventilation devices include ventilated storage cabinets, canopy hoods, snorkels, etc. These shall be provided as needed.

A.8.2.1 All laboratories where chemicals are used shall have available safety showers and eyewash stations. Eyewash fountains shall provide a soft stream or spray of aerated water for an extended period (15 minutes) and shall be tested monthly. These fountains shall be located near the safety showers so that, if necessary, the eyes can be washed while the body is showered.

A.8.3 Personal Protection. Personal protection starts with safety eyewear. Eye protection is required for all personnel, including visitors, where chemicals are stored or handled. Contact

lenses should not be used in the laboratory, but if they cannot be avoided, the laboratory supervisor shall be notified so special precautions can be taken. Other specialized eyewear may be needed for such things as laser hazards, ultraviolet, or other intense light sources. Other personal protective equipment may be required and is described below:

A.8.4 Medical Consultation and Examinations.

A.8.4.1 It is MSFC policy to promptly investigate all complaints to determine risk of employee overexposure to the toxic substances in their workplace.

A.8.4.2 There shall be a medical consultation whenever there is reason to believe an employee has been exposed to a hazardous chemical. Some examples of circumstances that would indicate the possibility of exposure are:

A.8.4.3 The employee had direct skin or eye contact with a chemical substance.

A.8.4.4 Odor was noticed, especially if the employee was working with any chemical which has a PEL or TLV below the odor threshold.

A.8.4.5 The employee is experiencing health hazard symptoms such as headache, rash, nausea, coughing, tearing, irritation or redness of the eyes, irritation of nose or throat, dizziness, loss of motor dexterity or judgment which resemble drunkenness, etc.

A.8.4.6 Some or all of the symptoms disappear when the employee is taken away from the chemical area and into fresh air.

A.8.4.7 Symptoms previously complained about reappear soon after the employee starts working with chemicals again.

A.8.4.8 Complaints are received from more than one person in the same work area.

A.8.4.9 The following information shall be provided to the physician:

a. The identity of the hazardous chemical to which the employee may have been exposed.

b. A description of the conditions under which the exposure occurred, including quantitative exposure data, if available.

c. A description of the signs and symptoms of exposure that the employee is experiencing, if any.

A.8.4.10 The Center shall maintain a written report from the physician in the employee's medical file which includes:

a. The results of the medical examination and any associated tests.

b. Any recommendation for further medical follow-up.

c. Any medical condition which may be revealed which may place the employee at increased risk as a result of a hazardous chemical found in the workplace.

d. A statement that the employee has been informed by the physician of the results of the examination and any medical condition that may require further examination or treatment.

A.8.4.11 It may be appropriate to conduct an "exposure evaluation" when there is a complaint of a possible hazardous exposure. This could involve interviewing the person initiating the complaint and the victim, if it is not the same person to gather information about the circumstances.

A.9 Personnel Training and Certification.

A.9.1 _(insert organization/department/office name)_ management shall provide employees with information and training to ensure that they are apprised of the hazards of chemicals present in their work area.

A.9.2 Initial training. Chemical hazard information shall be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations.

A.9.3 Refresher training. Refresher training shall be conducted on a routine basis as determined by the lab director.

A.9.4 Additional retraining shall also be conducted whenever a periodic inspection reveals or whenever this employer has reason to believe that there are deviations from or inadequacies in the employee's knowledge of proper lab safety practices or procedures.

A.9.5 The retraining shall reestablish employee proficiency and introduce new or revised practices and procedures, as necessary.

A.9.6 Content of training. Information to be presented in initial and refresher training. As a minimum, employees shall be informed of:

A.9.6.1 The contents of 29 CFR 1910.1450. The standard and its appendices shall be made available to employees.

A.9.6.2 The contents of the CHP shall be made available to employees.

A.9.6.3 The location and availability of this employer's CHP.

A.9.6.4 The permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard.

A.9.6.5 Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.

A.9.6.6 The location and availability of reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, MSDSs received from the chemical supplier.

A.9.6.7 Methods and observations that may be used to detect the presence or release of a hazardous chemical.

A.10 Chemical Hygiene Officer and Other Points of Contact.

A.10.1 (insert CHO name) is designated as the CHO for (insert organization/department/office name).

A.10.2 Other points of contact are: (insert names and telephone numbers)